

Cheilanthes feei New to Virginia

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The Slender Lip Fern, *Cheilanthes feei* Moore, is a widely distributed species of the western United States which occurs eastward to Arkansas, Missouri, Kentucky, and Illinois (Fernald, 1950; Steyermark, 1963; Cranfill, 1980; Mohlenbrock, 1967). The easternmost station for this fern was along Cedar Creek in Bullitt County, Kentucky, in a region known as The Knobs. This small population, discovered originally by Clyde Reed (Reed, 1952), is thought to be disjunct from the next nearest stations along the Ohio River in southern Illinois (Cranfill, 1980). *Cheilanthes feei* was discovered in 1979 by Bentley during a routine survey of the plants of Claytor Lake State Park, Pulaski County, Virginia. The actual identity of the plant went unknown until the station was visited by the authors on May 8, 1981, when the first voucher collections were made. This discovery is a remarkable disjunction of approximately 450 km eastward from the Bullitt County, Kentucky station and nearly 650 km from the more contiguous portion of its range from Illinois westward.

The preferred habitats of this fern are dry, exposed crevices in limestone or dolomite cliffs (Wherry, 1961; Mohlenbrock, 1967). Extensive exposures of this kind may be found along the New River in Virginia. Claytor Lake is a large impoundment of some 4500 acres formed in 1939 when the Appalachian Power Company built its Claytor Dam on the New River just upstream of Radford, Montgomery County, Virginia. In the southeastern sector of Pulaski County, the New River is deeply entrenched where it has cut through thick beds of limestone of the Rome formation and Elbrook dolomite, both of Cambrian origin. The more resistant dolomite forms nearly vertical cliffs, frequently several hundred feet high. The station for *C. feei* is a rather small but precipitous cliff, perhaps fifty feet high, which forms a nose-like projection along a westward facing portion of the shoreline. Because of the configuration of the rock, the exposures range from northwestern to southern. During a second visit to the outcrop on May 14, 1981, an estimate of 1200 plants was made. Most of these are extremely small and occupy nearly every minute fracture in the rock. Several hundred larger, mature plants crowd the deeper cracks and more protected, overhanging sites. Several smaller, shaded outcrops in oak woods adjacent to the main cliff support a considerable number of additional plants. Adjacent areas of the lake shore, where similar outcrops and exposures occur, were searched for additional populations of *C. feei*, but only six other plants were found on a very small ledge at the water level several hundred feet to the north. Since the normal pool elevation is approximately eighty-feet above the former river level, this same outcrop was undoubtedly much more extensive prior to flooding. A much larger population may have existed and, of course, other nearby populations may have been inundated by the lake waters.

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The flora of this outcrop is typical of many other outcrops in this portion of Virginia. Chestnut Oak (*Quercus prinus*) and Red Cedar (*Juniperus virginiana*) occur on a rather broad ledge and in deep crevices of the rock. Other woody species include *Rhus aromatica*, *R. radicans*, *Rhamnus lanceolata*, and *Clematis viorna*. Where soil accumulation is sufficient, a mat of vegetation has developed which is made up principally of *Poa compressa*, *Carex eburnea*, *Aquilegia canadensis*, *Aster oblongifolius*, and *Solidago sphacelata*. The *Carex* is particularly representative of such sites. Other ferns associated with the Lip Fern site are *Pellaea atropurpurea* and *Asplenium ruta-muraria*. A few individuals of *Pellaea glabella* were also found. Interestingly, the Slender Lip Fern overwhelmingly dominates the available space on the outcrop, despite the presence of other rock ferns characteristic of the habitat and common in this portion of the state. The presence of many individuals of various ages and colonization of such minute cracks is indicative of reproduction by spores. It is interesting that *Cheilanthes feei*, seemingly prolific at one station, has not colonized other available spaces in its proximity.

Other important fern distributions in Virginia are associated with the New River. The Venus Maidenhair, *Adiantum capillus-veneris*, was known only from a single 1879 collection from the same region of Pulaski County (Stevens, 1973). One of only two former stations for *Cheilanthes alabamensis* was a dolomite cliff along the New River in Giles County, Virginia, this being the northeasternmost record for the species.

The occurrence of *C. feei* in the Appalachian Valley of Virginia is particularly notable for several reasons. This record adds another species to the list of pteridophytes distributed primarily in the West or Southwest which occur as long-range disjuncts in the Southern Appalachians. Included in this list are *Asplenium septentrionale* (Emory, 1970), *Cheilanthes castanea* (Knobloch & Lellinger, 1969), and *Notholaena sinuata* (Univ. of Georgia Herbarium, pers. comm.). How these species have come to occur in the eastern states is an interesting question. The newly discovered Lip Fern station could be regarded as a relict from a former, more widespread distribution, or it could be considered an example of a long-distance dispersal. For other kinds of plants, the objections to the latter hypothesis are varied, but for leptosporangiate ferns, these are largely unfounded. Aerial dissemination of the minute spores over great distances does not stretch the imagination. This is pointed out by Shaver (1954) in a discussion of the disjunct occurrence of a coastal plain species, *Woodwardia virginica*, in Tennessee. Since the possibility of such an event is very small, time is a major constraint on the theory. The relictual theory attributes a more eastern (and presumably broader) distribution to more favorable climatic conditions sometime in the past. This is a concept familiar to most phytogeographers in the region. The shale barren flora, with its western affinities, has already drawn speculation as to how that endemic flora may have evolved (Keener, 1971). An eastward migration of several of these species (or their ancestral populations) may have occurred in response to a presumed warmer and drier climate, perhaps the Xerothermic Period (Sears, 1942). Even if such a climatic extreme did happen, it is reasonable to assume that the precipitous, xeric cliff habitat preferred by *C. feei* would still have occurred as isolated habitats and necessitated some rather

long "jumps" to get from one place to another. This kind of migration would have required long periods of time, as well. The fact that *C. feei* is found along New River is important in this regard. The New River, despite its name, is believed to be one of the oldest rivers in the world, being a remnant of the old Teays River which drained the area since the late Cretaceous Period. Consequently, there has been plenty of time—so much, in fact, that either hypothesis is plausible. The antiquity of the river affords us a dimension unavailable in most studies in plant geography. It is important to consider the many interesting plants which occur along New River, their distribution, and biology. Since there is so much more than a single, bizarre disjunction associated with the river, we prefer to think of this as another example in support of a relictual interpretation of the facts. The occurrence of *C. feei* in Pulaski County, Virginia substantiates the importance of the New River as an ancient source of specialized habitats and as a corridor for plant migrations through eons.

LITERATURE CITED

- CRANFILL, R. 1980. Ferns and Fern Allies of Kentucky. Kentucky Nature Preserves Commission Scientific and Technical Series Number 1.
- EMORY, D. L. 1970. A Major North American Range Extension for the Forked Spleenwort, *Asplenium septentrionale*. Amer. Fern J. 60:129–134.
- FERNALD, M. L. 1950. Gray's Manual of Botany, 8th ed., corrected printing. D. Van Nostrand, New York, NY.
- KEENER, C. S. 1971. The natural history of the mid-Appalachian shale barren flora. In P. C. Holt (ed.). The Distributional History of the Biota of the Southern Appalachians, Part II. Flora. Virginia Polytech. Inst. State Univ. Res. Div. Monog. 2.
- KNOBLOCH, I. W. and D. B. LELLINGER. 1969. *Cheilanthes castanea* and its allies in Virginia and West Virginia. Castanea 34:59–60.
- MOHLENBROCK, R. H. 1967. The Illustrated Flora of Illinois, Ferns. Southern Illinois University Press, Carbondale and Edwardsville.
- REED, C. F. 1952. Notes on the ferns of Kentucky, III. *Cheilanthes feei* on Silurian limestone in Kentucky. Amer. Fern J. 42:53–56.
- SEARS, P. B. 1942. Xerothermic Theory. Bot. Rev. 8:708–736.
- SHAVER, J. M. 1954. Ferns of Tennessee. Bureau of Publications, George Peabody College for Teachers, Nashville, TN.
- STEVENS, C. E. 1973. Looking for Virginia's maidenhair fern. Jeffersonia 7(4):18.
- STEYERMARK, J. A. 1963. The Flora of Missouri. University Press, Ames, Iowa.
- WHERRY, E. T. 1961. The Fern Guide, Northeastern and Midland United States and Adjacent Canada. Doubleday, Garden City, NY.